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PATENT SPECIFICATION

667,721

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Application made in France on July 7, 1949.

Complete Specification Published : Mar. 5, 1952.

Index at acceptance:—Class 110(ii), A(1a7:2x).

COMPLETE SPECIFICATION.

Improvements in Rotary Liquid-Meters.

We, COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATERIEL D'USINES A GAZ, of 12 Place des Etats-Unis, Montrouge (Seine), France, a Body Corporate, organised according to the laws of France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

The present invention relates to movable members of liquid meters and particularly the rotary pistons of volumetric meters.

In this type of meter there exists a measuring chamber in which a cylindrical rotary piston with an H-section or a cylindrical piston with U-section moves.

Figs. 1 and 2 illustrate the prior art;

Figs. 3 and 4 illustrate by way of non-limitative examples of the invention various embodiments of these measuring pistons for water meters;

Figs. 5 to 8 illustrate modifications in which non-cellular material is only provided on the surfaces having the maximum of friction on the walls of the measuring cylinders.

There will be seen in these Figs. 1 and 2 the measuring chambers 1 (Fig. 1) and 2 (Fig. 2) in which the rotary pistons 3 (Fig. 1), 4 (Fig. 2) turn.

The water enters and leaves by orifices not illustrated in the drawing. These arrangements are known.

It is known that the sensitivity is increased, and the minimum of accuracy considerably improved by diminishing the weight of the movable members and mainly that of the rotary pistons 3 and 4.

To attain this end for a long time a method has been employed of forming by machining closed air chambers in the pistons of these meters in order that their density may approach as close as possible that of water. This method has received application mainly in meters of large size.

[*Price* 2/8]

Unfortunately this method is expensive, it diminishes the resistance of the pistons to shocks, high pressure and water hammer and it cannot be applied to meters of small size which form the main quantity manufactured and of which it is particularly important to improve the sensitivity and the minimum flow, the sensitivity relating to functioning on very small output and the exactness to percentage indication of output.

In fact, for these small sizes it would entail too much labour to pierce numerous holes in the walls of the pistons which are of small thickness, and the reduction in weight obtained would be insufficient.

It has been recommended furthermore to lighten these measuring pistons by manufacturing them of moulded material having a number of small holes which do not communicate with each other, this porosity being adjusted in accordance with the density to be obtained, a density in which there is taken into consideration not only the weight of the piston alone, but also the combined weight of the piston and of its spindle.

However, it arises from the very porosity of the material that the contact surfaces between the piston and the cylinder are smaller than is the case with non-cellular material, consequently the pressure per unit of contact surface resulting from the action of the water is stronger. A more rapid wear will result as the friction per unit of effective friction surface is greater.

The present invention consists in manufacturing these measuring pistons so that they are formed of micro-cellular moulded material, but present however on their friction surface a layer of non-porous moulded material (ebonite or other plastic material), the whole of the piston and its rod having a density adjacent that of water.

The non-porous materials which we include are moulded materials of any kind,

but mainly of the ebonite type or of thermo-setting or thermo-plastic material.

The porous materials included are of the same type as above, the porosites being obtained by known methods. The cavities which communicate with each other may be filled with air, with carbonic acid, with liquid or with gel. It is obvious that the methods of manufacture are different in each case. When the cavities are filled with air, an air emulsion is necessary; when they are filled with carbonic acid, alkaline carbonates combined with weak acids would be employed; when they are filled with liquid, for example sulphonic alkyl-aryl alcohol may be employed, finally the gels may be obtained by the employment of gels of organic oxides.

Fig. 3 illustrates the section of an H-shaped piston of which all the external friction parts comprise without distinction an outer layer 5 of non-cellular moulded material in the interior of which is disposed cellular moulded material 6.

Similarly Fig. 4 illustrates the same arrangement for the U-shaped pistons also comprising at 7 a layer of non-cellular moulded material and at 8 moulded cellular material.

It will be noted in fact that in this type of volumetric meter, the water in its movement exerts on the piston according to the adjustment of the meter, dynamic forces either upwardly, or downwardly, or in both directions, consequently it was necessary to envisage pistons provided with non-cellular plastic material on the faces exposed to the maximum frictions, according to the results of experience.

Fig. 5 illustrates an H-shaped piston 10 of which the lower horizontal surfaces 9 and 9′ alone are subject to wear and therefore these surfaces alone have been provided with non-cellular moulded material.

Fig. 7 illustrates the same type of piston 12 which has all its horizontal faces, both lower and upper 11_1, 11_2, 11_3 and 11_4 provided with non-cellular moulded material.

Figs. 6 and 8 illustrate the same modifications for U-shaped pistons, Fig. 8 illustrating a piston 14 of which the lower faces 13_1 and 13_2 are provided with non-cellular material, and Fig. 6 illustrates a piston 16 of which the upper faces 15_1 and lower faces 15_2 of this U are provided with non-cellular moulded material. These examples take into account wear observed in practice.

In Figs. 3 to 8 the central part of the head of the pistons has been illustrated as formed of non-cellular moulded material with the object of ensuring a more rigid mounting of the piston spindle 17 (Figs. 1 and 2).

When it is intended completely to enclose the light part of the piston with an envelope of non-cellular moulded material, the manufacture thereof is effected by effecting a preliminary moulding of porous material which is then placed in a larger mould permitting enclosure with ordinary non-porous moulding material. In this case the preliminary moulding is supported by pins which locate the first stage moulding in the final mould. The vulcanisation ensures the cohesion of the two different materials.

There will be no departure from the ambit of the invention if the principle above mentioned is applied with a view to obtaining a measuring piston having a density adjacent that of the liquid to be measured by the combination of porous masses and of a covering, on the faces subject to usual wear, of a layer of plastic non-porous material. This material may be loaded with graphite or with any other load ensuring for it the best anti-friction qualities.

In the description there have only been illustrated pistons of H and U form, but the principle can be extended to a piston of any suitable form; disc, plate, cone and so on.

The meter may be used for any kind of liquid, in which case the moulded material is of a kind which will resist the action of the liquid. As liquids may be mentioned hot water, petrol, alcohol and so on. A suitable synthetic resin such as phenol formaldehyde resin may be used for petrol, certain plastic materials for hot water, and so on.

What we claim is:—

1. A measuring piston for rotary liquid meters of moulded material comprising a main mass of cellular moulded material, the wearing surfaces being provided with non-cellular moulded material, the degree of porosity of the cellular material being determined in a manner such as to give the whole piston a specific gravity as near as possible to that of the liquid to be measured.

2. Measuring pistons for rotary liquid meters constructed and arranged substantially as herein described with reference to and as illustrated in the accompanying drawings.

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667,721 COMPLETE SPECIFICATION

SHEET

This Drawing is a reproduction of the Original on a reduced scale

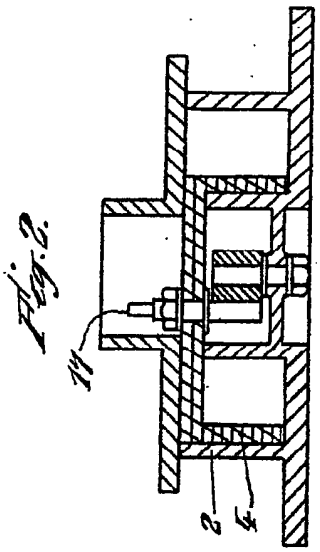

Fig. 2.

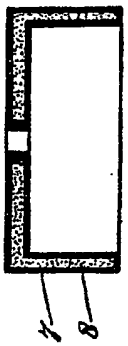

Fig. 4.

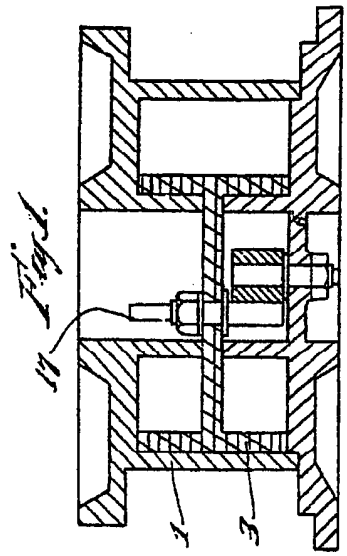

Fig. 1.

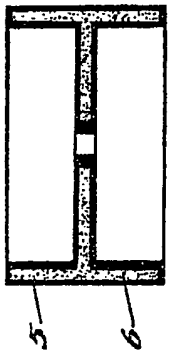

Fig. 3.

2 SHEETS

SHEET 1

Fig. 4.

Fig. 3.

SHEET 2

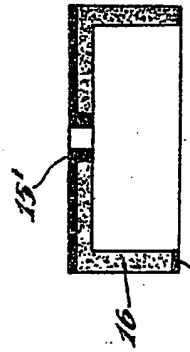

Fig. 6.

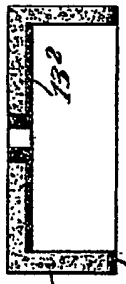

Fig. 8.

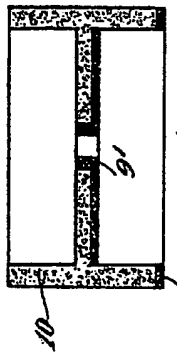

Fig. 5.

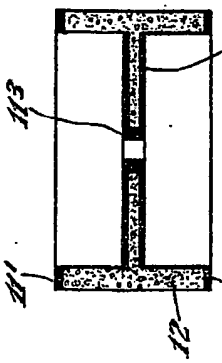

Fig. 7.

H.M.S.O. (M.F.P.)

667,721 COMPLETE SPECIFICATION

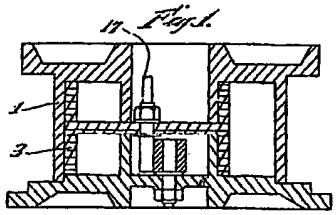

Fig. 1.

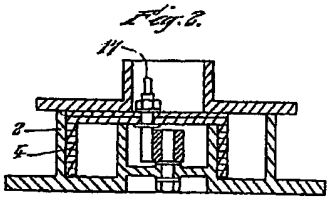

Fig. 2.

Fig. 3.

Fig. 4.

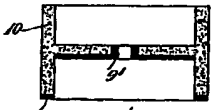

Fig. 5.

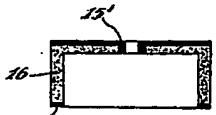

Fig. 6.

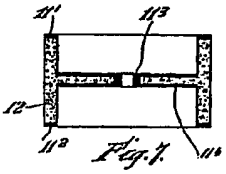

Fig. 7.

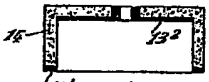

Fig. 8.